JACC: CARDIOVASCULAR INTERVENTIONS
VOL. 7, NO. 11, 2014

ISSN 1936-8798/$36.00
PUBLISHED BY ELSEVIER INC.
http://dx.doi.org/10.1016/j.jcin.2014.05.031

IMAGES IN INTERVENTION

Kounis Syndrome Manifesting as Coronary Aneurysm and Very Late Coronary Stent Thrombosis

Tomoya Hoshi, MD, Akira Sato, MD, Daiki Akiyama, MD, Masayuki Kawabe, MD, Daigo Hiraya, MD, Kazutaka Aonuma, MD

A 65-year-old woman, who was treated with a sirolimus-eluting stent (SES) (CYPHER) for the left anterior descending coronary artery (LAD) 36 months previously, presented with ST-segment elevation myocardial infarction, showing an acute thrombotic occlusion of the LAD stent (Figure 1A). Aspiration thrombectomy and subsequent balloon angioplasty were performed that resulted in Thrombolysis In Myocardial Infarction flow grade 3. Optical coherence tomography (OCT)

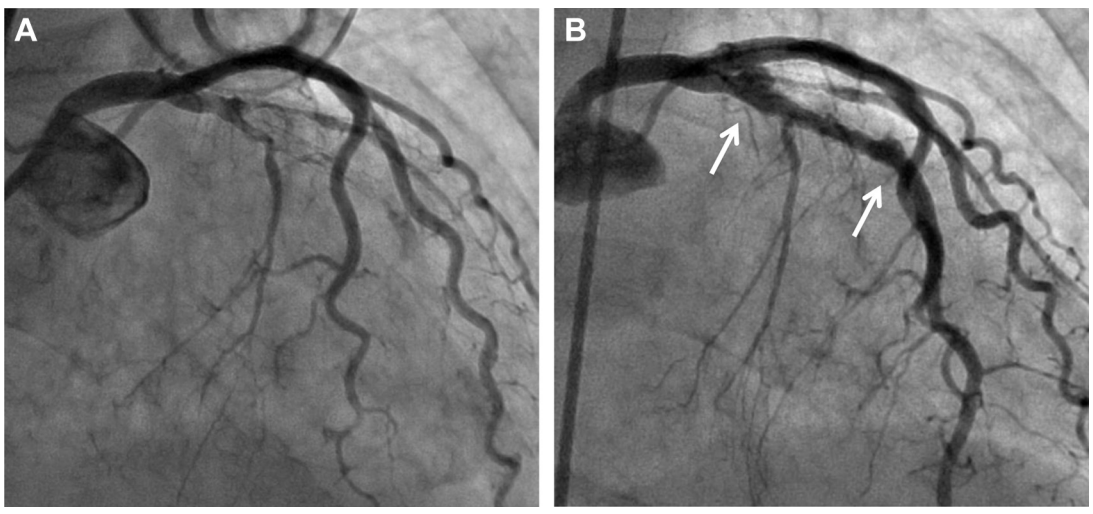

FIGURE 1 Images of Coronary Angiography

(A) Urgent coronary angiography demonstrated acute thrombotic occlusion within a sirolimus-eluting stent (3.0 mm in diameter, 28 mm in length). After aspiration thrombectomy and subsequent balloon angioplasty, coronary blood flow was successfully restored. **(B)** Repeat coronary angiography 1 month after development of stent thrombosis showed coronary aneurysms at the site of the proximal and distal stent edges **(arrows)**.

From the Cardiovascular Division, Faculty of Medicine, University of Tsukuba, Japan. The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Manuscript received May 9, 2014; accepted May 22, 2014.

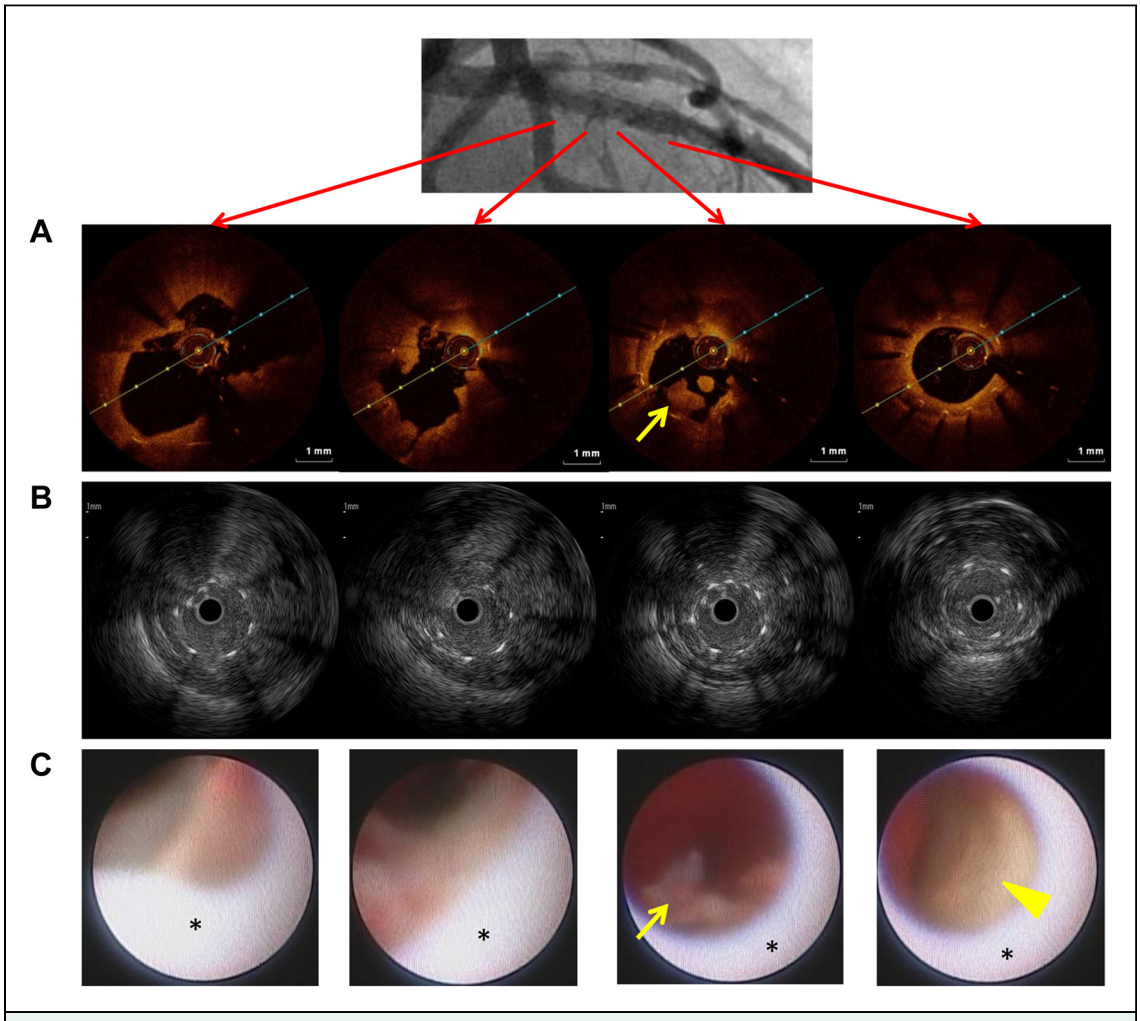

FIGURE 2 Intracoronary Images

Multimodality intracoronary images corresponding to the locations identified on the coronary angiogram at the time of very late stent thrombosis. **(A)** Optical coherence tomography showed residual thrombus overlying stent struts **(arrow)** (Online Video 1). **(B)** Intravascular ultrasound showed significant positive vessel remodeling of 8 mm in vessel diameter (Online Video 2). **(C)** Coronary angioscopy showed stent struts well covered by neointima with yellow color grade in the distal segment of the stent **(arrowhead)** and the existence of residual thrombus in the mid segment of the stent **(arrow)** (Online Video 3). **Asterisk (*)** indicates probing catheter.

showed residual thrombus overlying the stent struts (**Figure 2A**, Online Video 1). Intravascular ultrasound showed significant positive vessel remodeling of 8 mm in diameter and stent malapposition (**Figure 2B**, Online Video 2). Coronary angioscopy also showed residual thrombus and stent struts well covered by neointima with yellow color grade, suggesting in-stent neoatherosclerosis (**Figure 2C**, Online Video 3). Histological analysis of the extracted thrombus revealed a mixture of fibrin and platelet aggregates infiltrated with inflammatory cells consisting of neutrophils and eosinophils (**Figure 3**). One month later, repeat coronary angiography clearly revealed the formation of coronary artery aneurysms at both the proximal and distal stent edges (**Figure 1B**). OCT showed malapposed stent struts at the sites of positive remodeling, whereas multiple interstrut hollows and stent struts well covered by neointima were observed at other sites (**Figure 4**, Online Video 4).

Currently, very late drug-eluting stent (DES) thrombosis is of major concern because of the potentially catastrophic complications. On the basis

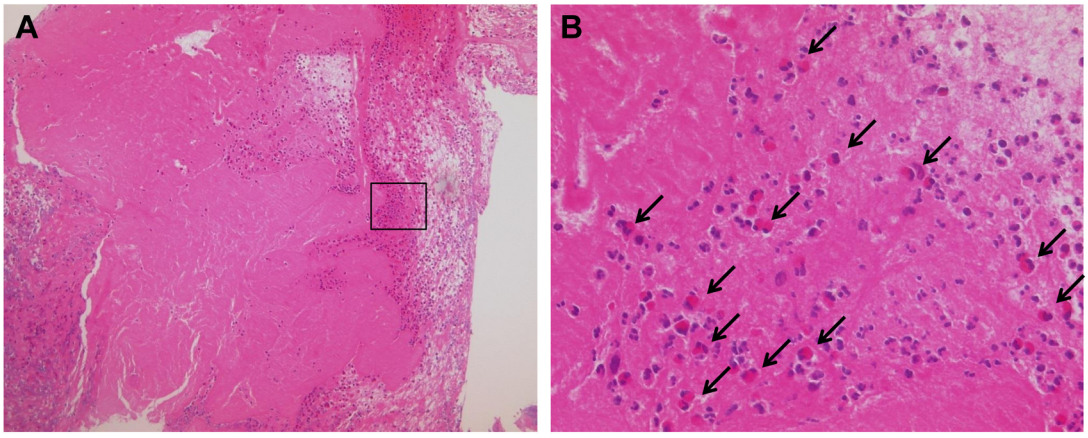

FIGURE 3 Histological Images

Hematoxylin and eosin stain of the aspirated thrombotic material showed fibrin thrombi with inflammatory infiltration of neutrophils and eosinophils (**A**: 40× magnification and **B**: 100× magnification). **Arrows** indicate the infiltration of eosinophils.

of postmortem histological analysis, infiltrates of inflammatory cells, such as eosinophils, have implicated a contributory allergic or hypersensitivity reaction in DES thrombosis (1). Recently, type III, a third variant of Kounis syndrome, has been proposed to be the concurrence of DES thrombosis with a hypersensitivity reaction to components of the stent (2,3). To our knowledge, this is the first report

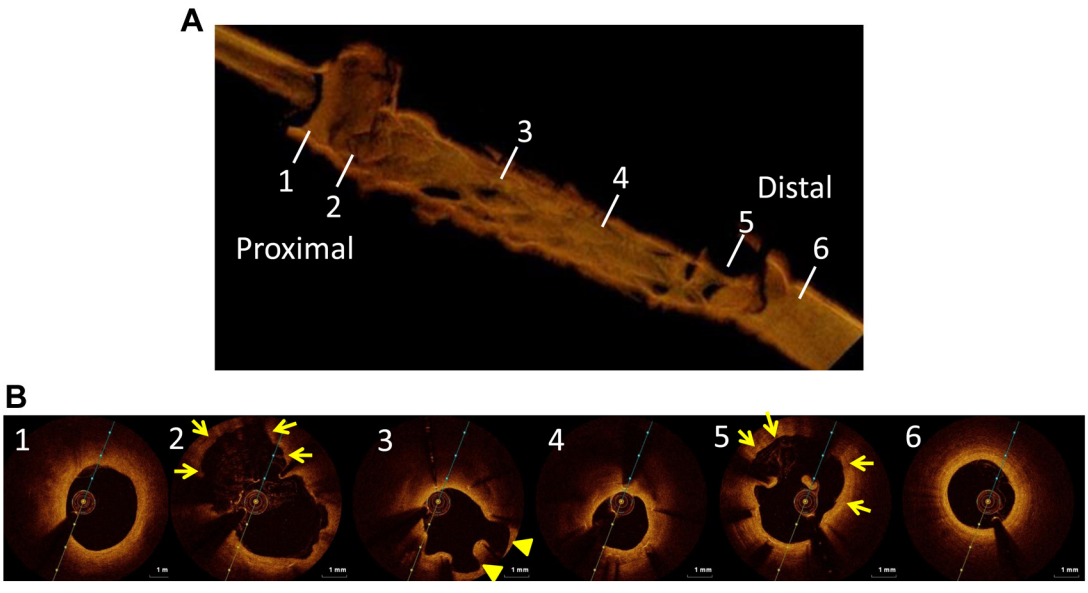

FIGURE 4 Images of OCT

Repeat optical coherence tomography (OCT) images at 1 month after stent thrombosis (Online Video 4). **(A)** Three-dimensional OCT reconstruction image. **(B)** Cross-sectional OCT images showing multiple interstrut hollows **(arrowheads)** at the mid-segment of the stent and coronary aneurysms with malapposed stent struts at both the proximal and distal stent edges **(arrows)**.

on Kounis syndrome manifesting as a concurrence of coronary aneurysm and very late DES thrombosis. The existence of eosinophilic infiltrates supports the role of a hypersensitivity reaction in the development of DES thrombosis and coronary aneurysm.

REPRINT REQUESTS AND CORRESPONDENCE: Dr. Tomoya Hoshi, Cardiovascular Division, Faculty of Medicine, University of Tsukuba, 1-1-1, Tennodai, Tsukuba-City, Ibaraki 305-8575, Japan. E-mail: hoshi.tm@md.tsukuba.ac.jp.

REFERENCES

1. Chen JP, Hou D, Pendyala L, Goudevenos JA, Kounis NG. Drug-eluting stent thrombosis: the Kounis hypersensitivity-associated acute coronary syndrome revisited. J Am Coll Cardiol Intv 2009;2:583–93.

2. Biteker M. A new classification of Kounis syndrome. Int J Cardiol 2010;145:553.

3. Kounis NG. Coronary hypersensitivity disorder: the Kounis syndrome. Clin Ther 2013;35:563–71.

KEY WORDS coronary angioscopy, eosinophil, optical coherence tomography, very late stent thrombosis

APPENDIX For supplemental videos, please see the online version of this paper.